Claims

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[c1] 1. An apparatus for detecting a hot rail car surface comprising:
an infrared sensor for acquiring an infrared signal from a rail car surface of a rail car and transducing said infrared signal into an electrical signal;
a rank filter for filtering said electrical signal to produce a filtered array;
a first peak detector for detecting a maximum filtered value of said filtered array; and
a first comparator for comparing said maximum filtered value to a detection threshold to produce a filtered alarm signal.

[c2] 2. The apparatus of claim 1 wherein said rank filter has a rank of about one-half.

[c3] 3. The apparatus of claim 1 further comprising:
a wireless transceiver for acquiring rail car surface characteristics from a wireless tag mounted on said rail car; and
a filter parameter calculator for calculating a filter length and rank of said rank filter as a function of said rail car surface characteristics.

[c4] 4. The apparatus of claim 1 further comprising:
an unfiltered signal buffer for buffering said electrical signal to produce an unfiltered array;
a second peak detector for detecting a maximum unfiltered value of said unfiltered array;
a second comparator for comparing said maximum unfiltered value to said detection threshold to produce an unfiltered alarm signal; and
an alarm comparator for comparing said unfiltered alarm signal to said filtered alarm signal to produce a censored false alarm signal.

[c5] 5. The apparatus of the previous claim wherein:
said censored false alarm signal comprises a binary signal having a true value when said unfiltered alarm signal differs from said filtered alarm signal and a false value otherwise; and
said apparatus further comprises a counter for counting said false values to produce a censored false alarm count.

[c6] 6. The apparatus of the previous claim further comprising a failure isolator for diagnosing a failure mode from said censored false alarm count.

[c7] 7. An apparatus for detecting a hot rail car surface comprising:

an infrared sensor for acquiring an infrared signal from a rail car surface of a rail car and transducing said infrared signal into an electrical signal;

a rank filter for filtering said electrical signal to produce a filtered array;

a first peak detector for detecting a maximum filtered value of said filtered array;

a first comparator for comparing said maximum filtered value to a detection threshold to produce a filtered alarm signal;

a wireless transceiver for acquiring rail car surface characteristics from a wireless tag mounted on said rail car;

a filter parameter calculator for calculating a filter length and rank of said rank filter as a function of said rail car surface characteristics;

an unfiltered signal buffer for buffering said electrical signal to produce an unfiltered array;

a second peak detector for detecting a maximum unfiltered value of said unfiltered array;

a second comparator for comparing said maximum unfiltered value to said detection threshold to produce an unfiltered alarm signal; and

an alarm comparator for comparing said unfiltered alarm signal to said filtered alarm signal to produce a censored false alarm signal.

[c8] 8. The apparatus of the previous claim wherein:

said censored false alarm signal comprises a binary signal having a true value when said unfiltered alarm signal differs from said filtered alarm signal and a false value otherwise; and

said apparatus further comprises a counter for counting said false values to produce a censored false alarm count.

[c9] 9. The apparatus of the previous claim further comprising a failure isolator for diagnosing a failure mode from said censored false alarm count.

[c10] 10. A method for detecting hot rail car surfaces, the method comprising:

acquiring an infrared signal from a rail car surface of a rail car;
transducing said infrared signal into an electrical signal;
filtering said electrical signal using a rank filter to produce a filtered array;
detecting a maximum filtered value of said filtered array; and
comparing said maximum filtered value to a detection threshold to produce a filtered alarm signal.

[c11] 11. The method of claim 10 wherein said rank filter has a rank of about one-half.

[c12] 12. The method of claim 10 further comprising:
acquiring rail car surface characteristics from a wireless tag mounted on said rail car; and
calculating a filter length and rank of said rank filter as a function of said rail car surface characteristics.

[c13] 13. The method of claim 10 further comprising:
buffering said electrical signal to produce an unfiltered array;
detecting a maximum unfiltered value of said unfiltered array;
comparing said maximum unfiltered value to said detection threshold to produce an unfiltered alarm signal; and
comparing said unfiltered alarm signal to said filtered alarm signal to produce a censored false alarm signal.

[c14] 14. The method of the previous claim wherein:
said censored false alarm signal comprises a binary signal having a true value when said unfiltered alarm signal differs from said filtered alarm signal and a false value otherwise; and
said method further comprises counting said false values to produce a censored false alarm count.

[c15] 15. The method of the previous claim further comprising diagnosing a failure mode from said censored false alarm count.

[c16] 16. A method for detecting hot rail car surfaces, the method comprising:
acquiring an infrared signal from a rail car surface of a rail car;

transducing said infrared signal into an electrical signal;
filtering said electrical signal using a rank filter to produce a filtered array;
detecting a maximum filtered value of said filtered array;
comparing said maximum filtered value to a detection threshold to produce a filtered alarm signal;
acquiring rail car surface characteristics from a wireless tag mounted on said rail car;
calculating a filter length and rank of said rank filter as a function of said rail car surface characteristics;
buffering said electrical signal to produce an unfiltered array;
detecting a maximum unfiltered value of said unfiltered array;
comparing said maximum unfiltered value to said detection threshold to produce an unfiltered alarm signal; and
comparing said unfiltered alarm signal to said filtered alarm signal to produce a censored false alarm signal.

[c17] 17. The method of the previous claim wherein:
said censored false alarm signal comprises a binary signal having a true value when said unfiltered alarm signal differs from said filtered alarm signal and a false value otherwise; and
said method further comprises counting said false values to produce a censored false alarm count.

[c18] 18. The method of the previous claim further comprising diagnosing a failure mode from said censored false alarm count.